1: Conzemius M-4, 5 (1921) 1932
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to Punta Gorda for a proposed railway. The naturalist H. A. Wickham lived in Nicaragua (Rio Escondido and Pearl Lagoon) from October, 1867, to June, 1868, in order to collect birds. His ethnographical notes pertaining to the Ulwa are of great interest.

A few years later the French mining engineer, Paul Lévy, traveled on the Mosquito Coast to carry on researches for the Government of Nicaragua. Among the minor contributors to the ethnology of the Mosquito Coast of the nineteenth century are the following: Bovallius, the Swedish zoologist (1881–1883); K. von Girsewald (1892), who spent six months in the gold regions of Pispis; Bruno Mierisch, the government engineer of Nicaragua, who explored the gold regions between Rio Coco and Rio Grande in 1892 and 1893.

In 1900 the celebrated German traveler, Dr. Karl Sapper, who is intimately acquainted with Central America, visited the Miskito and the Sumu living on and about Rio Bocay. The ethnographical specimens collected by him are in the Stuttgart Museum. A collection of ethnographical and archeological material obtained by Doctor Neuhaus around Rio Escondido about this same period is in the Museum für Völkerkunde (Berlin). The German linguist, Walter Lehmann, also investigated these tribes in the course of his voyage to Central America (1907–1909), but unfortunately the ethnographical part of his studies has not yet appeared. The Honduran schoolteacher, Francisco Martínez, also collected interesting ethnological data during his stay at the Sumu village Guampú on Rio Patuca (1916–17). Unfortunately his various contributions have all appeared in local newspapers and reviews of very difficult access.

Finally mention must also be made of the work done by several Moravian missionaries, especially Heath, Grossmann, Reichel, Martin, Ziock, and Siebörger. The books by Schneider and Brindeau are based nearly exclusively upon the investigations of these missionaries.

Since the war the work has been continued by Americans. H. J. Spinden visited Rio Coco and the coast of Nicaragua in 1917–18, and the coast of Honduras in 1923. Dr. A. H. Schultz, of the Johns Hopkins Medical School, carried on some anthropological studies on the Atlantic coast of Nicaragua, examining 25 Rama and 12 Sumu Indians. During the same year (1924) D. E. Harrower, of the Museum of the American Indian, Heye Foundation, was collecting ethnological specimens during two months among the Miskito, Sumu, and Rama.

GENERAL REMARKS ON THE MISKITO

The Miskito are estimated at about 15,000, which number exceeds that of all the other Indian tribes of the Mosquito Coast combined. They are largely mixed with Negroes, for which reason the Spaniards have called them "Zambos," meaning Negro and Indian half-breed, a name which is appropriate.

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The Miskito readily intermarry with foreigners. They assimilate all races; the children always speak the language of the mother and grow up as Miskito, whether the father be "Creole," "Ladino," Carib, Negro, Sumu, Rama, Paya, North American, European, Syrian, or Chinaman. The villages between Wounta and Rio Hueso show this phenomenon to perfection. (Heath, a: 50.) Consequently the pure Indian tribes, as the Sumu, Paya, and Rama, are rapidly diminishing in numbers, whereas the Miskito, owing to the influx of fresh blood, are holding their own.

In spite of the fact that the Miskito have been since the seventeenth century in contact with buccaneers, British traders, and settlers, mahogany cutters, rubber bleeders, and Moravian missionaries, they have not changed considerably in their mode of life. Their tribal name appears first in the works of the piratical sea rovers, the English calling them generally "Moskite" and "Moskito," and the French "Moustique" and "Moustiquais."

Exquemelin (Engl. ed.: 250; French ed.: II, 264–265) calculates the number of the Miskito at about 1,500 to 1,700, including 200 Negro slaves. In those days they were divided into two subtribes having but little relation with each other. One of them lived at Cabo Gracias a Dios, the other at Moustique (=Sandy Bay?). The Indians from this latter place occasionally accompanied the buccaneer vessels, the others being less courageous on the sea. Dampier states, however, that the whole tribes comprised less than 100 men (Dampier: I, 7). Raveneau de Lussan (437–438), who writes about the same time, says that the Miskito of Cabo Gracias a Dios and lower Rio Coco were largely mixed with Negroes, while those at Sandy Bay were still pure Indians. In 1699 the Miskito occupied the seacoast from Cabo Camarón in Honduras to about 57 miles south of Brangmans River (=Wawa River?), where the territory of the Sumu began. The coast line of their territory had an extension of about 285 miles; they had, besides, two settlements on the lower Rio Coco (M. W.: 299). From the details given by the latter author the total population of this tribe numbered close to 1,000. In 1725 the Miskito numbered about 2,000 men altogether and were ruled by three chiefs (Lade). Bell (a: 250), who lived many years in the country, estimated the total Indian population of that territory at about 10,000 to 15,000, of which the Miskito numbered nearly one-half. The present writer calculates the total number of this tribe at about 15,000, of which at least one-third live on both banks of Rio Coco as far up as Rio Bocay, that is, 275 to 300 miles from the sea. In the Republic of Honduras, from Rio Coco to Rio Tinto, may be found from 3,000 to 4,000 Miskito, who inhabit the seashore and lagoons as well as the lower Rio Patuca. The remainder of this tribe lives in Nicaragua, from Rio Coco to Pearl Lagoon.

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In spite of the distribution of the Miskito over so vast a territory, the dialectical variations of their language are comparatively insignificant. Five dialects have been observed by the writer (vide Conzemius, d: 59–64). A small part of the Miskito has kept aloof from admixture with the Negro; these are called *Tāwira* "Heavy-haired."[2] Lehmann (c: I, 105, 107, 464) attempts to connect the ancient Chuchures of Panama with the Miskito, but this theory is barely acceptable. These Chuchures are said to have arrived in canoes from Honduras, and they settled in the neighborhood of Nombre de Dios. But their number gradually declined owing to disease and they finally disappeared altogether.

Many corrupted English words have passed into the speech of the Miskito, while words borrowed from Spanish are much less common. In certain regions, especially on the upper Rio Coco, a large number of Sumu words have been incorporated in the language.

GENERAL REMARKS ON THE SUMU

Inland from the Miskito, from Rio Patuca to Rio Punta Gorda, live the more primitive Sumu, who speak a related language. They inhabit chiefly the headwaters of the larger rivers or the affluents thereof. Owing to close intermarriage and lack of hygienic living conditions they are rapidly diminishing in numbers, and the day of their complete disappearance or absorption by the Miskito does not seem far off. Their total number is estimated at about 3,000 to 3,500.

The Sumu are split into different subtribes speaking various dialects which are almost mutually intelligible. These are known by the names *Twahka*, *Ulwa*, *Panamaka*, *Bawihka*, and *Kukra* (vide Conzemius, d: 64–73). The three first named of these subtribes number about 1,000 each, the Bawihka not more than 150, while the Kukra are practically extinct.

The Twahka inhabit the northern section of the Sumu territory and are found on the rivers Patuca (Guampú), Coco (Lakus and lower Waspuk), Wawa and Kukallaya. The Panamaka live on Rio Coco (Bocay and upper Waspuk) and on Rio Prinsapolca, while

[2] For the pronunciation of the Indian words the following phonetic system has been used:

a, *e*, *i*, *o*, *u*, correspond to the sounds of these vowels in German or Spanish.
ai as *ai* in "aisle."
au as *ow* in "how."
oi as *oi* in "boil."
ñ as *ng* in "sing."
x as Spanish *j* or German *ch* in "ach" or Scotch *ch* in "loch."
y is always a consonant.
Nasalization of vowels is indicated by the tilde (~) as in Portuguese.
All the other letters have approximately the same value as in English.

1: Conzemius M-4, 5 (1921) 1932
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Meanwhile the Twahka lived in the bush. They were wild and unkempt; their hair fell to their knees and they were full of lice. Finally the King of the Miskito sent for them and captured them; he had them washed and altogether regenerated them, so that he won their love and obtained their support.[7]

The language of the Miskito is closely allied to that of the Sumu, but it also contains many foreign words. It is very probable that the Miskito were originally a subtribe of the Sumu, and that they have become greatly modified in the course of the centuries through intermarriage with Negroes, Europeans, and other Indian tribes. Already in 1875, at a time when the relationship of the Miskito and Sumu languages was still unknown, Zúñiga Echenique (209) considered the Miskito as the offspring of fugitive slaves with Twahka women. Of the various Sumu subtribes still existing, the Bawihka is the one which linguistically and ethnographically presents the greatest affinity to the Miskito. The Bawihka formerly occupied the region immediately adjoining the coast line where the Miskito were met with by the first Europeans during the latter part of the seventeenth century. These facts induce me to believe that the hybrid tribe of the Miskito owes its origin to the intermarriage of the Bawihka with the Negroes escaped from the slave ship which was wrecked to the south of Cabo Gracias a Dios in 1641.

These Africans arrived on a Portuguese slave ship captained by Lourenço Gramalxo. The vessel had taken its black cargo on board while anchoring at the Guinea Coast, and then headed for Brazil. While on the high seas the Negroes revolted and made themselves masters of the ship. Not knowing anything about the art of navigation they allowed their vessel to be carried by the trade wind and ocean currents toward the coast of Central America, where it became wrecked on the Mosquito Keys, situated a little south of Cabo Gracias a Dios. The Negroes, who were able to reach the mainland, were captured by the Indians and reduced to slavery. They were, however, allowed to intermarry with their masters, and their children grew up as free members of the tribe. (Vide Peralta, b: 57–58, 121; Exquemelin, French ed.: II, 276–277; Edwards: V, 210; M. W.: 303, 307.)

Henderson (216) states, however, that these Africans proceeded from the Samba country in West Africa and that their vessel was Dutch. This is repeated by Roberts (153), Young (71–72) and De Kalb (27). The last named author further specifies that the vessel in question was wrecked in 1650 and that the Africans proceeded from Samba Island at the mouth of the Cassiri River in Senegambia. Bell (b: 3) likewise considered the vessel as Dutch and says that it was wrecked near Dakuna at the beginning of the eighteenth century. This date is, however, incorrect.

[7] The addition regarding the Miskito King is of recent date. No mention is made of the other Sumu subtribes, as the Panamaka, Bawihka, or Kukra.

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144 On the other hand, Santaella Melgarejo, in a report dated Guatemala, April 3, 1715 (Peralta, b: 78–80), states that the vessel in question was English and that it was wrecked in 1652 on the Cajones or Tiburones Keys to the east of Cabo Gracias a Dios. Fearing the Indians from the mainland, the Negroes settled at first at some keys south of the mentioned Cajones (undoubtedly the Mosquito Keys), and once friendly relations were established with the natives, they established themselves at Cabo Gracias a Dios.

Again it is said that the vessel in question was Spanish and bound for Cuba (Raveneau de Lussan: 437–438; Heath, a: 51).

Our source material pertaining to the origin of these slaves is therefore very meager and contradictory. According to a report of Fray Benito Garret y Arlové, dated November 30, 1711 (Peralta, b: 57), one of these Africans, an old man named Juan Ramón, who lived in Granada (Nicaragua) related that about one-third of his countrymen were captured by the Indians and reduced to slavery. The others took to the bush, whence they carried on a crude warfare with the aborigines, who were finally compelled to retreat toward the interior. About 1672 the number of these African slaves held by the Miskito was estimated at about 200; in those days they had already adopted the language and customs of the Indians (Exquemelin, Fr. ed.: II, 276–277).

As a result of the above, the Miskito from Cabo Gracias a Dios to Sandy Bay had already a large admixture of African blood toward the end of the seventeenth century. In the course of time refugee slaves from the English settlements and more recent immigration of Negroes and Mulattoes (chiefly from the West Indies) have contributed to the spreading of the African type, so that to-day Negro characteristics may be observed in almost every village. One of the subtribes of the Miskito, the *Tāwira* who live a short distance inland, from Sandy Bay to Wawa River, however, have refused to mingle their blood with that of the Africans. It is only in recent years that they have begun to intermarry with the mixed Miskito, especially with newcomers from Rio Coco, so that soon a Miskito of pure Indian blood will be a thing of the past.

197 We do not know to what extent these African slaves have influenced the original language of the Miskito, for such researches would entail exhaustive comparative studies with the surrounding Indian languages (Sumu, Paya, Rama), with the Creole dialects of the West Indies, and the languages of the Guinea Coast. The vowel scale is exactly the same as in the Jamaican Creole dialect; several of the peculiar phrases of everyday life are found literally translated into English in Jamaica (Heath, a: 51).

173 We are also indebted to Mr. Heath for a Miskito migration legend which is said to have been given out as authentic by Eduardo Pereira,

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pendence from Spain and the English authorities from Jamaica renewed their friendly relations with the Indians. In fact, one of the chiefs from the area was crowned with solemnity by the British at Belize, British Honduras, and made king, thus reestablishing a British protectorate system. The "Mosquito" (Miskito) Kingdom in those days included the whole Atlantic Coast of Central America from Chiriqui Lagoon (latitude 9° N.) to Cabo Honduras, a coastline of 700 miles.[7] However, in 1847 the territory became restricted to the territory between Cabo Honduras and Río San Juan, the jurisdiction of which was under British colonials. During these years under British supervision Orland W. Roberts,[8] an active trader on the eastern coast of Nicaragua, gave an accurate account of Miskito Indian customs. Reports were also given by Young,[9] Fröebel,[10] the most important being the text by Bell,[11] who lived in the territory from 1846 to 1862. From 1863 to 1868 John Collinson, a civil engineer, made two voyages to this coast and left an account of his travels.[12] H. A. Wickham,[13] (1867-1868) made a collection of birds from Río Escondido and Pearl Lagoon; P. Levy made researches for the Nicaraguan government[14] and other studies were made by the Swedish zoologist Bovallius,[15] and by K. Von Girsewald, [16] B. Mierisch,[17] and K. Sapper, who obtained a series of ethnographical specimens for the Stuttgart Museum.[18]

Inasmuch as there is a considerable admixture of Negro with the Miskito Indians it may be well to examine the possible reason for this

[8] Roberts, Orlando W. Narrative of Voyages and Excursions on the East Coast and in the Interior of Central America. Edinburgh, 1827.

[9] Young, Thomas. Narrative of a Residence on the Mosquito Shore, During the Years 1839, 1840 and 1841. London, 1895.

[10] Fröebel, Julius. Aus Amerika. Erfahrungen, Reisen and Studien. 2 vols. Leipzig, 1857-1858.

[11] Bell, Charles Napier. Remarks on the Mosquito Territory; its Climate, People, Productions, etc. Journal of the Royal Geographical Society, 1862, *32*, 242-268. London.

[12] Collinson, John. The Indians of the Mosquito Territory. Memoirs of the Anthropological Society of London. 1870, *3*, 148-156. London.

[13] Wickham, H. A. Notes of a Journey among the Woolwa and Moskito Indians. Proceedings of the Royal Geographical Society. 1869, 13, 58-63. London.

[14] Levy, Paul. Notas geográficas y económicas sobre la República de Nicaragua. Paris, 1873.

[15] Bovallius, Carl. Resiai Central-Amerika (1881-1883) Upsala, 1887.

[16] Girsewald, K. Von. Sechs Monate in Nicaragua. Braunschweig, 1896.

[17] Mierisch, B. Eine Reise nach den Goldgebieten in Osten von Nicaragua. Petermanns Mitteilungen. 1893, *39*, 25-39. Gotha.

[18] Sapper, K. Reise auf dem Rio Coco (Nordlickes Nicaragua). Globus, 1900, 78, 249-252, 271-276, Braunschweig; Proceedings of the Nineteenth International Congress of Americanists, 1917, 206-210.

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144 175 In 1875 at the time when the relationship of Miskito and Sumu languages was still unknown, Zúñiga Echenique[19] considered the Miskito Indians as the offspring of fugitive slaves with *Twahka* women (see appendix A). Of the existing Sumu tribes today the *Bawihka* is the [197] one wich linguistically and ethnologically is the closest to Miskito. The *Bawihka* formerly occupied the area of the coastline where the first Europeans made contact. The fact that Echenique had suggested that the Miskito were derived from slaves and Indians and the fact that the *Bawihka* were on the coast induced Conzemius[1] to deduce that intermarriage between Negroes and Indians, an ordinary occurence today, was a possibility in earlier times.

In 1641 a slave ship was wrecked off Cabo Gracias a Dios. The Africans were on a ship commanded by Lourenço Gramalxo.[20] While on the high seas the Negroes revolted and mastered the ship and not knowing navigation allowed the vessel to be carried by trade winds, where it became wrecked on the Mosquito keys. The Negroes reached the mainland and were made slaves by the Indians. However, they were allowed to inter-marry and their children became free members of the tribe. There appears to be some controversy as to the owner of the vessel and the year it foundered.[21 y 22]

As a result the Miskito from Cabo Gracias a Dios to Sandy Bay developed an admixture of African blood. This Mixture was enhanced by the coming of other refugee slaves and the more recent immigrations of Negroes and mulattoes from the West Indies. The extent to which [197] the Indian language was influenced by the African newcomers is unknown; the vowel scale of many people in certain villages is the same as the Jamaican creole dialect. [23 y 24].

000 In recent times important contributions with regard to the Miskito

[19] Zúñiga Echenique, Melquisidec. Descripción geográfica del departamento de la Mosquitia, practicada en el año de 1875. Madrid, 1905.

[20] Vide: Peralta, M. M. Costa Rica y la Costa de Mosquitos. Madrid-Paris, 1898; footnote Nº 3; Edwards, B. The History, Civil and Commercial, of the British West Indies, 5 vols. London, 1819. Heath, G. R., quoted by Conzemius (footnote 1), loc. cit. p. 17.

[21] De Kalb, Courtenay, Nicaragua: Studies on the Mosquito Shore in 1892. Jour. Amer. Geographical Soc. of New York. 1893, *25*, 236-288. versus opinion expressed by Peralta (footnote 20).

[22] Lehmann, W. Ergebnisse einer Forschungsreise in Mittelamerika und Mexico. Zeitschrift fur Ethnologie, 1910, *42*, 687-749.

[23] Conzemius, E. Notes on the Miskito and Sumu Languages of Eastern Nicaragua and Honduras. Internat. Jour. Amer. Linguistics, 1929, *5*, 57-115.

[24] Heath, G. R. Notes on Miskito Grammar and on other Indian languages of Eastern Nicaragua. Amer. Anthropologist. 1913, *15*, 48-62.

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362 ralization can be directly applied to diets in the tropics: the galaxy of
177 nutritional factors are determined by the local situation and the food habits of the people.

164 The same can be said of tropical infectious disease. The variety of vectors, their ecological relations to circumstances determined by altitude, rains, swamps, climate and vegetation limit disease entities to special regions even though many diseases occur throughout the world. It must be remembered that to the diseases generally present among people are added those which are peculiar to a new environment and that modifications of a disease can take place. For instance, whooping cough is a serious disease attended with a high mortality rate in Central Nicaragua, whereas scarlet fever produces a mild disease often unrecognized. Whether the host or the organism is responsible for such a condition is not known and the problem of host and parasite interrelationships becomes a complex one.

THE MOSQUITO AREA: THE LOCAL SITUATION

101 The vast region on the Atlantic side of Nicaragua and Honduras is known by the name of Mosquito coast. It is inhabited buy four different tribes of Indians: The Miskito, the Suma (Sumu), the Paya, and the Rama. In some localities the Miskito, often incorrectly called [144] Mosquito, have a considerable admixture of Negro blood and, for this reason, are in some places called Zambos. The other three tribes, however, are practically of pure Indian blood. In earlier times, the 101 western region of the Mosquito coast was occupied by the Matagalpa 197 Indians, whose language extended over a large area in Nicaragua and Honduras, but has been extinct for nearly half a century. However, a dialect of its is spoken to this day by the older inhabitants of the Salvadorean villages of Cacaopera and Lislique. Today the Indian languages of the area are somewhat interrelated, especially Matagalpa, Miskito, and Suma; Paya is an unrelated language.

101 The Miskito and small isolated bands of Suma Indians inhabit
361 the eastern side of Honduras and Nicaragua. They are found from the Río Tinto (lat. 15° 50′ N.) to Río Punta Gorda (Lat. 11° 30′ N.). The villages are located chiefly along the banks of the rivers as far up as the headwaters within the jungle proper. The Suma Indians are found primarily in the interior; they are somewhat uncommunicative, but cooperative. The Miskito are self-sustaining and at times derive ad- [146] ditional income from labor with fruit companies, mining enterprises and rubber collecting agencies. Today they play an important part in the wild rubber collection program.

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The Miskito Indians, numbering about 20,000, are a mixed race, since there has been much inter-marrying with negroes, creoles, Spaniards, Caribs, Sumu, Syrians and Chinese. About one-half of them have negroid physical characteristics, another third non-specific physical features and a few appear to be of pure Indian blood. There is, however, the same behavior pattern in all of them; they live together and there is no cultural differentiation on a physical basis. The culture and language are predominantly Indian, though some of them speak a little Englsih or Spanish. The name "Mosquito Coast" may have been derived from the Indian tribe, the Miskito, or it may have been derived from the numerous mosquitoes found in the area.

The climate is humid and tropical. The average temperature along the seacoast rarely registers below 65° F. or above 90° F. Such pleasant temperatures are due to the trade winds that blow fairly steadily for about seven months of the year. From Bilwas Karma inland, the heat is intense, humid, and at times unbearable. At higher altitudes near the headwaters of the Coco (or Wanks) River, conditions are less severe. The whole area is well watered by many streams which empty into the larger rivers, which in turn drain into the Caribbean sea. In the jungle area these rivers are the only means of communication or transport. During flood times the rivers rise tremendously, often as much as thirty feet in a single night, the crumbling banks bringing down trees and everything along the edge. For this reason the villages are built high up on the banks and usually some distance from the stream. The average rainfall is reported to vary from 250 to 320 inches a year. There are two dry and two set seasons each year, but these conditions are only relative, since it is always humid in the interior. The dryest seasons are from about March to May and from late August to early October. The remainder of the time it rains almost incessantly, sometimes all day. In the dry season light showers occur frequently. These geophysical conditions contribute significantly to the food-agricultural status of the people.

Geographically the area can be divided as follows: along the seashore it is sandy, with an inland belt of about twenty miles, consisting of swamps; then an area fifty to one hundred miles wide of intermittent savannah, and finally the thick, dense, somewhat impenetrable jungle which covers everything, even the mountains. Violent winds and hurricanes are not infrequent.

Besides the Miskito and the Sumu, two other Indian tribes, the Paya and the Rama, live in eastern Nicaragua. The population of these tribes is unknown, but it is considered to be about 500. Conzemius[1] reported in 1932 that they numbered about 700 but stated that they

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The solution of ethnological problems by the helminthological approach is not without its difficulties and as such is beyond the scope of this report. On the basis of Sandground's data the prevailing hookworm infection among pure blooded Indians should be *Ancylostoma duodenale* but where Negroes have settled and intermingled the infestation becomes dominantly *Necator americanus*. In the Coco Basis, where hookworms were introduced primarily by negroes, the infestation, as far as our obeservations permitted, was that of *N. americanus*.

It is of interest to note that onchocerciasis was not found in the Coco Basin even though the writer thought he had found two patients with this disease. The biopsy material was poorly prepared and there was some question as to the identity of the filarial worms. That the diagnosis was probably erroneous was further strengthened by the fact that *Simulium* flies transmitting this disease were not seen. However, the limited observations in searching for the fly were by no means thorough and do not exclude the possibility of their existence or that of the disease. It may be that in years to come when commerce between natives is increased the appearance of onchocerciasis may become an obvious clinical finding.

Cases of Schistosomiasis have been reported from Panama, Costa Rica and Yucatán but none have been reported from Guatemala[70] nor were we able to find any in Central Nicaragua. Even though *S. mansoni* and *S. hematobium* are of Ethiopian origin, the appearance of negroes in the Coco Basin did not introduce the disease and this fact is ascribed to the absence of the species of snails suitable for the larval development of the parasite.

The commonest worm infestations in the Indians of the Coco Basin were *Ascaris lumbricoides* and *Trichuris trichiura*. The former was common in communities which do not possess sanitary facilities and is contracted by ingesting eggs that are expelled in the feces. The latter, "whip worms", whose eggs are able to withstand adverse environmental conditions, almost to the same extent as those of Ascaris, was commoner than the former and the "pinworm" *Enterobius vermicularis* was frequently found. *T. saginata* and *T. solium* have been noted by others in the area studied but were not observed by us.

[70] Sandground, J. H. Helminthic infections in Guatemala in a Medical Survey of Guatemala. Carnegie Institution of Washington, 1938.